



UNCLASSIFIED

LA-4954-MS

AN INFORMAL REPORT

Copy No.

**C.3**

PUBLICLY RELEASABLE  
LANL Classification Group

28/95 - Grant

CIC-14 REPORT COLLECTION  
REPRODUCTION  
COPY

# The Implications of Collateral Damage from Nuclear Weapons (U)

LOS ALAMOS NATIONAL LABORATORY  
3 9338 00414 6766

CLASSIFICATION CHANGED TO **UNCLASSIFIED**  
BY AUTHORITY OF Sen. declass. schedule of E.O. #11652  
DOCUMENT IDENTITY Man. Docu., 4-29-82  
VERIFIED BY Marvick Dobbins, 4-29-82  
(SIGNATURE AND DATE)

**Los Alamos**  
**scientific laboratory**  
of the University of California  
LOS ALAMOS, NEW MEXICO 87544



UNITED STATES  
ATOMIC ENERGY COMMISSION  
CONTRACT W-7405-ENG. 36

**INTERNAL SECURITY**  
Unauthorized Disclosure Subject to  
Criminal Sanctions.



UNCLASSIFIED

EC 80  
8/31/1

SECRET  
031710

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Atomic Energy Commission, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

In the interest of prompt distribution, this LAMS report was not edited by the Technical Information staff.

Classified by Louis G. Gibney, Jr., Classification Officer, ISD-6.

Subject to general declassification schedule of Executive Order No. 11652. Automatically downgraded at two-year intervals and declassified on December 31, 1980.

SECRET  
031710

This document consists of 7 pages

No. 33 60 copies, Series A

~~SECRET~~

UNCLASSIFIED

LA-4954-MS  
An Informal Report

ISSUED: June 1972



# The Implications of Collateral Damage from Nuclear Weapons (U)

by

R. G. Shreffler



UNITED STATES  
ATOMIC ENERGY COMMISSION  
CONTRACT W-7405-ENG. 36

~~SECRET~~  
INFORMATION

Unauthorized Disclosure Subject to  
Criminal Sanctions.

UNCLASSIFIED

~~SECRET~~

UNCLASSIFIED

SECRET  
LA-4954-MS

USAEC, Headquarters Library, Reports Section, Washington, D. C.	1-3
Manager, ALO, Albuquerque, New Mexico	4
Lawrence Livermore Laboratory, Livermore, California	5-6
Attn: C. A. McDonald	
M. R. Gustavson	
Sandia Corporation, Albuquerque, New Mexico	7-10
Attn: W. A. Gardner, 1500	
C. H. Mauney, 1530	
R. G. Clem, 1730	
A. A. Lieber, 1750	
Military Liaison Committee, Washington, D. C.	11
Director, Defense Research and Engineering, Washington, D. C.	12
Headquarters, Defense Nuclear Agency, Washington, D. C.	13
Defense Nuclear Agency Field Command, Kirtland AFB, New Mexico	14-16
Commanding General, Army Combat Developments Command, Fort Belvoir, Virginia	17-18
Commanding General, Army Materiel Command, Washington, D. C.	19
DCS/Operations, Army, Washington, D. C.	20
Chief, R&D, Army, Washington, D. C.	21
Naval Ordnance Systems Command, Washington, D. C.	22
Chief of Naval Operations (OP-75), Washington, D. C.	23
DCS/Research and Development, Headquarters, USAF, Washington, D. C.	24
Director, Air Force Weapons Laboratory, Kirtland Air Force Base, New Mexico	25-27
Kaman Sciences Corporation, Colorado Springs	28
Attn: John Hoffman	
Rand Corporation, Santa Monica, California	29
Attn: M. G. Weiner	
Los Alamos Report Library	30-60

SECRET

UNCLASSIFIED

SECRET  
 STAFF

UNCLASSIFIED

THE IMPLICATIONS OF COLLATERAL DAMAGE  
 FROM NUCLEAR WEAPONS

by

R. G. Shreffler\*

## ABSTRACT (U)

The subject of collateral damage from nuclear weapons is discussed with emphasis placed upon the political and military aspects of the subject. Collateral damage is defined and evaluated. The historical context and pertinent issues are discussed.

## I. INTRODUCTION

The remarkable success achieved in splitting the nucleus of the atom to produce the nuclear weapon stands in sharp contrast to the stunted evolution of a doctrine for the constrained use of those weapons. A considered position on the political and military implications of the collateral damage produced by nuclear weapons is an example of a topic of fundamental importance in the development of such a doctrine, and one which has been given little attention. In this paper an attempt is made to explore this subject.

Collateral damage in the execution of a war is defined as that unintended destruction which should be avoided, if possible. It is almost always claimed that collateral damage resulting from conventional war is far less than that expected in a nuclear conflict. This statement need not be true if a nuclear engagement were to take place under a rational strategy supported by a compatible military force, both of which are designed to avoid the massive use of nuclear firepower, and to deal realistically with

the military problems.\*\* In any case, attention in this article is focused on collateral damage produced by nuclear weapons and means to minimize this quantity without sacrificing military efficiency.

When plans are made to employ strategic nuclear weapons for assured destruction, collateral damage to an enemy is not a consideration. Indeed, the goal in such an encounter is a maximum of urban destruction. The killing of civilians and the destruction of production capacity become legitimate substitutes for military deaths and ICBM silo destruction. With assured destruction as a goal, constraints are minimal. Collateral damage is an issue only when weapons are used in a constrained engagement.

## II. EVALUATION OF COLLATERAL DAMAGE

To determine the feasibility of a plan for the use of tactical nuclear weapons, in the context of

\*The author acknowledges the substantial contribution to this paper made by William S. Bennett, and Samuel T. Cohen, Rand Corporation. Other interested colleagues at Los Alamos and Sandia Laboratories Albuquerque have also made valuable criticism.

\*\*As an example: An environment that excludes the engagement of the U.S. and Soviet *strategic* forces as a planning factor, that recognizes the necessity for disengaging theater forces from U. S. strategic forces, is predicated on forward defense--defense at the borders with nuclear weapons--and is not committed to obsolete concepts of war termination. It goes without saying, however, that such an example is not now the policy of the U.S. and would present issues that go beyond the scope of this paper.

collateral damage, there must be some method for delineating its scope and acceptability. This can be accomplished only after much deliberation between the political decision-makers and the military authorities of all the allies involved in a particular location within a theater.

In evaluating collateral damage, the following elements require consideration:

1. Civilian Casualties. In all cases, the number of civilian casualties is an important element in the evaluation of collateral damage. In general, casualties among friendly civilians weigh more heavily than casualties among enemy civilians, though not all enemy nor all friendly civilian casualties are evaluated the same.

2. The Industrial and Cultural Base of a Country. An argument can be made that collateral damage should be measured by the degree of damage to the industrial and cultural investment of a country. This argument might have appeal if one could view a war only in terms of its final net result--the view an aggressor might take when planning to invade another country, or the attitude anyone might assume who assesses the result of a war a number of years after the event. Almost certainly such an approach would not be acceptable to the members of a defensive alliance such as NATO, on whose soil, by definition, a large fraction of the war would be planned to be fought. In this case the regard for life is believed to outweigh significantly the value of capital investment.

3. Conventional vs Nuclear Emotions. A study by NATO military authorities of atomic demolition munition (ADM) use in the mountains of a NATO country serves as a case in point regarding the political reaction to the use of conventional and nuclear weapons. The simulated use of high-yield ADMs resulted in estimates of some 10,000 civilian casualties. For various reasons the government concerned refused to allow this study to be openly reviewed. Almost certainly the major reason was the problem of civilian casualties. It was argued by the military authorities that 10,000 civilian casualties were far less than would result from a conventional assault. This, of course, goes to the point. Military planning for conventional war does not involve this type of operation with its predictable collateral result. In

contrast to conventional defense the use of nuclear weapons, and particularly ADMs, requires detailed advanced planning which, among other things, exposes such sensitive issues as collateral damage. Unfortunately, this cited study, an excellent piece of work, might have been reviewed by the NATO political authorities had the military authorities mildly restricted their study to the proper use of low-yield ADMs, thereby essentially eliminating civilian casualties.

4. Military Personnel. It is difficult to evaluate the cost of friendly collateral military casualties. From the point of view of the political decision-maker, the cost is accepted as a cost of war--military people are expendable. The same attitude is probably held by the military commander, provided his loss is covered by a suitable gain.

Clearly the scope of this problem is broad, and an accurate measure of its various weighted elements is difficult to achieve. There is bound to be a wide divergence of opinion. Even when some consensus is reached, its evaluation will be complex. Some simplification almost certainly is required to facilitate communication, particularly in time of crisis, between the political decision-maker and the military commander. A reasonable approach would be to restrict that dialogue to consider only civilian deaths. Possibly a gross weighting factor would serve to distinguish between damage to an agrarian community and damage to an industrial community. That portion of collateral losses which consists of military casualties--both friendly and enemy--might be best resolved within the area of military tactics.

### III. HISTORICAL COMMENT

Until recently little attention has been given to the subject of collateral damage from nuclear weapons. There are a number of reasons:

1. During the early period of weapon development there was little fissile material. Efforts were focused upon achieving the maximum yield from a given mass of fissile material. Lower yield weapons, often associated with low collateral damage, are less efficient in the use of this material and hence were not given serious thought.

2. The development of a nuclear arsenal was based upon conventional delivery methods, which, from the point of view of collateral damage, were

UNCLAS

UNCLASSIFIED

frequently unacceptable for nuclear weapon delivery, especially when surface bursts were involved, since these produce excessive fallout. Such side effects were accepted by the military who did their best to make do by interpreting such effects to their advantage--"bonus kills," etc.

3. There was a tendency on the part of many strategists and policy makers to protect the incredibility and horror syndrome associated with the use of nuclear weapons. They deemed it not to their advantage to promote the rationality of low-collateral damage weapons. In the NATO theater, nuclear conflict was promoted as a conflict not significantly different than what would take place in a strategic war with assured destruction as its goal. The British gave strong support to this picture through a series of war games that employed many hundreds of 30- to 50-kiloton warheads in a European nuclear war.\* These views were officially aired in the unclassified literature of the United Nations and the Western European Union. Such an attitude prevailed particularly in the 1960s in support of the "fire-break" philosophy, a philosophy put forward in the United States that attempted to equate--through the escalation process--all nuclear weapons, regardless of their yields.

4. U.S. strategy for the use of theater nuclear weapons, as reflected in the NATO strategy of massive retaliation, placed minimal restrictions on collateral damage. This strategy, which was in force through December 1967, employed tactical nuclear weapons after the release of the U.S. strategic force. Though our strategy has changed to one of flexible response, the military approach remains essentially unchanged.

To a large degree, these historical rationales have become entrenched and remain to plague us.

#### IV. ISSUES OF IMPORTANCE

Of recent date, the subject of collateral damage has been given serious attention by the NATO Nuclear Planning Group. It was first raised as an issue in The Hague at the April 1968 meeting of that organization. It has been given more formal attention in the "Provisional Political Guidelines for the

\*Sir Solly Zuckerman, Scientists and War: The Impact of Science on Military and Civil Affairs, Harper and Row, 1966.

Partial Defensive Tactical Use of Nuclear Weapons by NATO," a document approved by the NATO ministers in December 1969. Certainly it is a major topic in any discussion between political decision-makers and military authorities in searching for rules of nuclear engagement. This complex dialogue involves a number of issues:

1. The general aim of the political leader is to minimize collateral damage to his own population. Collateral damage to any other country--allied or enemy--is of much less concern. As an example, there is a constant pressure from certain of our NATO allies promoting the early use of the strategic exchange of megaton weapons between the U.S. and the Soviet Union. At the same time they are reluctant to consider more than a token number of relatively low-yield nuclear weapons on their own soil.

2. The responsibility of a military commander is to optimize the military effectiveness of the force at his command. He tends to be wary of the subject of collateral damage, since, at first glance, insistence upon constraints threatens to limit his fighting capability. This attitude leads to a lack of confidence in the military commander by the political decision-maker to consider the release of nuclear weapons. Equally important, the military force structure based upon premises that ignore collateral damage may be militarily quite inappropriate to fight a theater nuclear war.

3. Since World War II there has been a fundamental change in the position of the political decision-maker with respect to the military commander. The reasons for this change, no doubt, are numerous; however, a major catalyst has been the nuclear weapon. Whatever the cause for the change, the day is long past when the political decision-maker, having reached a political impasse, turns over--indeed almost surrenders--the responsibility for resolving the matter to the military commanders on the battlefield. Unpleasant and sensitive as the subject is to the military commander, the political decision-maker will retain control in most developed countries. The conflict in Vietnam presents a good example. With the serious deployment of nuclear weapons into a theater this control will almost certainly increase. The reasonable objective for the political decision-maker should be to exercise control with confidence

UNCLASSIFIED

UNCLASSIFIED

and assurance and at the same time not seriously inhibit the military commander's efficiency. This objective can be reached only by the establishment of a rapport based upon a common position with respect to collateral damage. Unfortunately, it is probably fair to say that today this problem is not recognized.

4. It is pointless to discuss collateral damage without realistically relating it to the problem of possible constraints. In its broad sense, a constraints policy defines a large segment of the strategy in a particular theater. It serves to constrain

- the range, type, and deployment of nuclear and conventional weapons to be employed,
- portions of the battle area where either nuclear or conventional weapons may or may not be used,
- the anticipated levels of collateral damage in allowed parts of the battle area by both nuclear and conventional weapons, and
- the conditions under which nuclear weapons might be employed in preference to conventional weapons.

Evidently, an acceptable constraints policy, agreed to by both political and military authorities, must be developed in conjunction with and as part of an overall strategy which also considers

- the threat assessment,
- the objectives of a theater war and well-defined and appropriate concepts of war termination,
- the attitude in the theater toward a war of assured destruction both inside and outside the theater,
- the rules of engagement such as the time at which nuclear weapons would be introduced, consultation between allies on the use of nuclear weapons, and command and control procedures, and
- anticipated reaction of the opponent.

5. In principle, a military force should be structured only after a strategy, with its associated constraints policy, has been formulated. Even so, it will be extremely difficult for military groups to achieve the degree of reorganization required to support a rational nuclear strategy. However, without such adjustment the situation may be hopeless and quite unacceptable. Herein lies a significant dilemma.

6. Even with our current tactical nuclear stockpile there is a large number of weapons which,

if properly selected and correctly employed, will make it possible to reduce substantially the level of collateral damage. Delivery methods, fuzing, terminal guidance, and target acquisition have improved remarkably in the past few years. When fully applied, the combination of these improved technologies may allow the accurate and discriminate application of firepower in a manner that matches it to the intended military target. Newer nuclear warheads promise extensions of this improvement to the point where military effectiveness can be further increased, yet collateral damage can be reduced to a degree where a constraints policy can be formulated which does not seriously conflict with the military necessities.

7. A perplexing issue that inevitably arises with the subject of collateral damage and constraints policies has to do with the behavior of an unconstrained enemy. What level of death and destruction would accrue in NATO if the Warsaw Pact attacked or responded with high-yield weapons in an indiscriminate manner?

In considering this question, it is necessary to assume at the outset that we are prepared to make meaningful military use of our nuclear weapons in cases other than for assured destruction. In fact, it is pointless to discuss the matter of collateral damage in the context of a force that is employed only as a façade. Such a force serves little purpose but to signal our dependence on an assured destruction force. As a consequence, the preoccupation in Europe with the "demonstrative use" of nuclear weapons strongly detracts from the credibility of the NATO tactical nuclear capability. One must assume a meaningful tactical nuclear fighting force predicated on an environment in which escalation of a war to an assured destruction exchange is highly improbable.\*

Against such a NATO force, the Warsaw Pact might still attack with high-yield weapons. But there are a number of points which decrease the concern about this response:

a. Even high-yield weapons can be used efficiently and with some degree of discrimination by the Soviets if they are assigned to appropriate targets and are properly fuzed. This is not to say that

\*See footnote \*\*, pg. 1

UNCLASSIFIED



they can be used with the flexibility and utility that one associates with a stockpile containing lower yield, more discriminating weapons.

b. Against a restructured and highly dispersed NATO nuclear force (in contrast to the current conventionally deployed force), the effectiveness of higher yield Warsaw Pact weapons is significantly reduced. Thus, such a posture would present far fewer attractive targets for high-yield weapons.

c. With the assumed NATO force, the morale of both the NATO military and civilian populations would be far more able to meet any nuclear attack.

d. By employing high-yield weapons in an indiscriminate manner, the Soviets would be conducting a war which held little purpose for achieving any rational political objectives. What would be the point in largely destroying the prize they sought?

Thus we conclude that the use of high-yield weapons by the Soviets may not necessarily be to their advantage if NATO were to realistically restructure itself. The possible use of high-yield weapons need not serve as a strong reason for NATO

not to develop a nuclear capability based upon a broad spectrum of military options, and a stockpile that includes well-conceived weapons.

Of course, it is entirely possible that the Soviets have no intention to employ high-yield weapons against NATO and, instead, have developed and deployed a discriminate tactical nuclear capability which would be highly effective against NATO's currently postured forces.

#### V. CONCLUDING REMARKS

Obviously the implications of collateral damage from nuclear weapons is a complicated subject. However, a realistically considered position on such damage is fundamental to the formulation of a credible strategy for the use of nuclear weapons. From this strategy can follow a new military force structure, which then makes it possible to determine requirements for a meaningful nuclear stockpile. Trying to solve the problem in reverse--by first developing a stockpile of weapons--is costly in effort, money, and time, and serves in avoiding the central issues.

KT/ar: 60

UNCLASSIFIED